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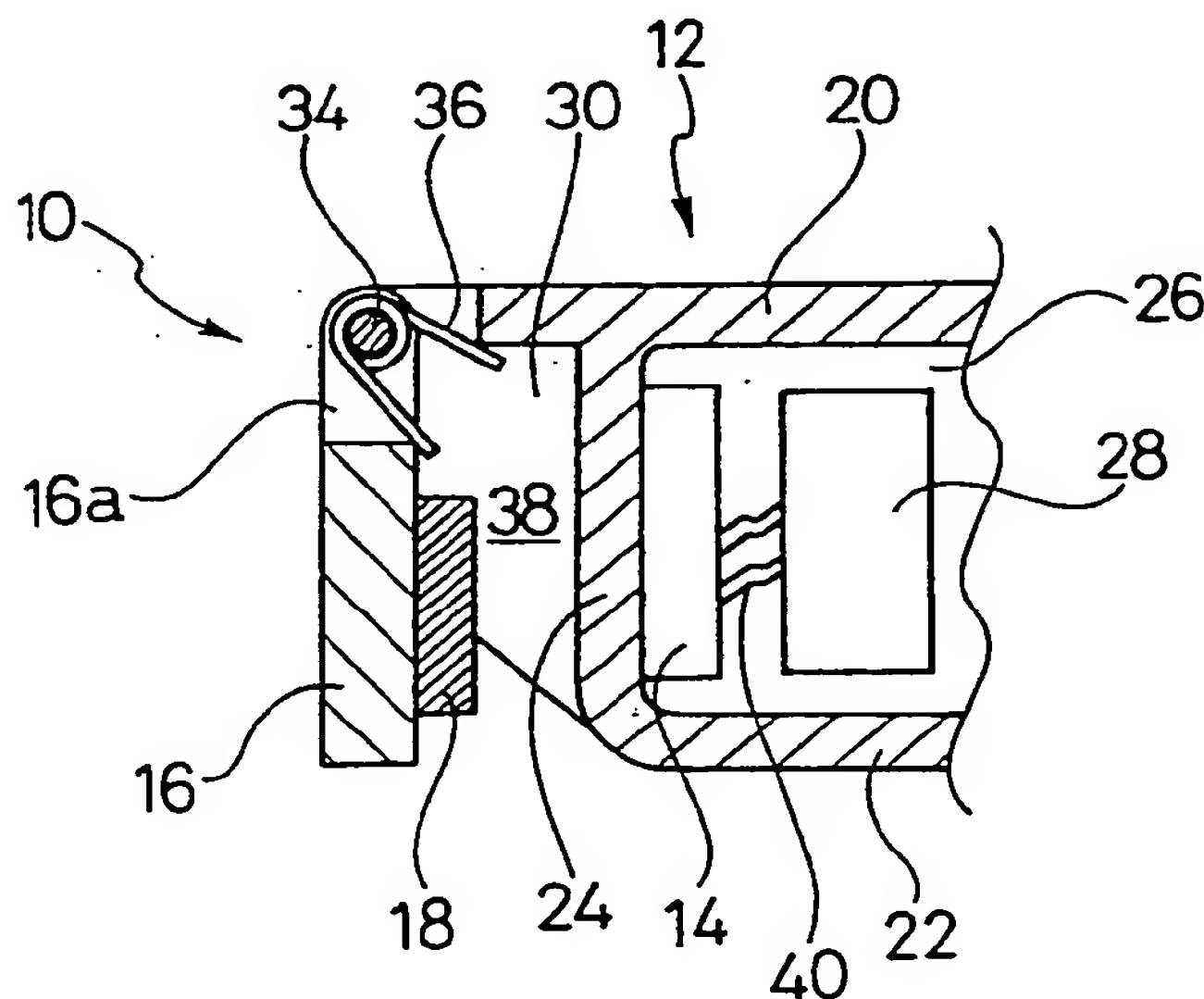
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(54) **Weatherproof switch assembly**

(57) An assembly 10 is provided. The assembly 10 includes a casing 12 having a magnet sensitive switch 14 enclosed therein, and a magnet 18 movably associated with the outside of the casing 12. The magnet 18 is capable of movement relative to the casing 12. The

magnet 18 can be disposed in at least two positions. The at least two positions include a first position where the magnetic field generated by the magnet 18 does not affect the switch 14, and a second position wherein the magnetic field generated by the magnet 18 does affect the switch 14.



**FIG. 3**

## Description

### Field of the Invention

**[0001]** The present invention relates to a weatherproof switch assembly and more particularly a weatherproof cycle computer switch assembly.

### Background of the Invention

**[0002]** As shown in Figure 1, cycle computers are often mounted on the handlebars of a bicycle or other cycle. The present invention is described herein as used with a bicycle. It will be understood that this is not a limitation on the present invention. The weatherproof casing and switch assembly described herein can be used in any situation where a weatherproof casing that includes a switch is desired.

**[0003]** When in use, bicycles, and therefore, cycle computers often encounter adverse weather conditions, such as rain or snow. The casing surrounding the computer must be weatherproof to prevent moisture from getting to the components of the computer, including the switch. In the prior art, the switch protrudes from the casing of the cycle computer and is sealed with rubber or other elastomeric material. However, the seal can easily be compromised, which typically results in moisture getting inside the casing and short circuiting the switch or other components therein.

**[0004]** A long felt need exists for a computer casing and switch that are substantially weatherproof and prevent moisture from getting into the cycle computer casing.

### Summary of the Preferred Embodiments

**[0005]** In accordance with one preferred embodiment of the present invention there is provided an assembly including a casing having a magnet sensitive switch enclosed therein, and a magnet movably associated with the outside of the casing. The magnet is capable of movement relative to the casing. The magnet can be disposed in at least two positions. The at least two positions include a first position where the magnetic field generated by the magnet does not affect the switch, and a second position wherein the magnetic field generated by the magnet does affect the switch.

**[0006]** In a preferred embodiment, the assembly includes a flip hingedly secured to the outside of the casing and the magnet is secured to the flip. The flip can be secured to the casing by a hinge pin or the casing and the flip can be formed as a single unit, such that the flip is connected to the casing by a piece of resilient material. In another preferred embodiment, the magnet is secured to a button movably coupled to an outside of the casing.

**[0007]** In accordance with another aspect of the present invention there is provided a cycle computer in-

cluding a casing having a screen and a magnet sensitive switch enclosed therein, an electric circuit disposed inside the casing, and a magnet movably associated with said casing, such that the magnet is capable of movement relative to said casing. The circuit includes the switch and a processor electrically connected to the switch and the screen. The magnet can be disposed in at least two positions including a first position where the magnetic field generated by the magnet does not affect the switch and a second position where the magnetic field generated by the magnet does affect the switch.

**[0008]** In accordance with yet another aspect of the present invention there is provided a cycle computer including a casing having a front wall, a back wall, and a plurality of side walls that cooperate to surround a casing interior and a pair of opposed members extending outwardly from a first side wall, an electric circuit disposed inside the casing, a flip hingedly secured to the opposed members by a hinge pin, a spring disposed on the hinge pin and biasing the flip in a predetermined position, and a magnet secured to the flip. The front wall includes a screen and the circuit includes a magnet sensitive switch secured to the first side wall of the casing, and a processor electrically connected to the switch and the screen. The flip positions the magnet in at least two positions including a first position where the magnetic field generated by the magnet does not affect the switch, and a second position where the magnetic field generated by the magnet does affect the switch.

**[0009]** In accordance with yet another aspect of the present invention there is provided a cycle computer including a casing having a front wall, a back wall, and a plurality of side walls that cooperate to surround a casing interior and a button housing extending outwardly from a first side wall, an electric circuit disposed inside the casing, a button movably coupled to the button housing, a spring disposed in the button housing and biasing the button outwardly, and a magnet secured to the button. The front wall includes a screen and the circuit includes a magnet sensitive switch secured to the first side wall of the casing, and a processor electrically connected to the switch and the screen. The button positions the magnet in at least two positions including a first position where the magnetic field generated by the magnet does not affect the switch, and a second position where the magnetic field generated by the magnet does affect the switch.

**[0010]** In accordance with yet another aspect of the present invention there is provided a cycle computer including a casing having a front wall, a back wall, and a plurality of side walls that cooperate to surround a casing interior, an electric circuit disposed inside the casing, a flip hingedly secured to the casing by a piece of resilient material that biases the flip in a predetermined position, and a magnet secured to the flip. The front wall includes a screen and the circuit includes a magnet sensitive switch secured to the first side wall of the casing, and a processor electrically connected to the switch and

the screen. The flip positions the magnet in at least two positions including a first position where the magnetic field generated by the magnet does not affect the switch, and a second position where the magnetic field generated by the magnet does affect the switch.

**[0011]** In accordance with yet another aspect of the present invention there is provided a method of turning on a cycle computer. The method includes the steps of providing a magnet sensitive switch, providing a magnet a predetermined distance from the switch, moving the magnet closer to said switch to change the state of the switch and energizing the cycle computer.

**[0012]** Other objects, features and advantages of the present invention will become apparent to those skilled in the art from the following detailed description. It is to be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the present invention, are given by way of illustration and not limitation. Many changes and modifications within the scope of the present invention may be made without departing from the spirit thereof, and the invention includes all such modifications.

#### Brief Description of the Drawings

**[0013]** The invention may be more readily understood by referring to the accompanying drawings in which

FIG. 1 is an oblique view showing a pair of cycle handlebars having a cycle computer affixed thereto. FIG. 2 is a perspective view of a cycle computer casing and switch assembly in accordance with a first embodiment of the present invention.

FIG. 3 is a sectional side elevation of the cycle computer casing and switch taken along line 3--3 of FIG. 2, showing the switch disposed in the casing interior and showing the flip in an open position.

FIG. 4 is a sectional side elevation similar to FIG. 3 showing the flip in a closed position.

FIG. 5 is a sectional side elevation of a cycle computer casing in accordance with a second embodiment of the present invention.

FIG. 6 is a section side elevation of a cycle computer casing in accordance with a third embodiment of the present invention. Like numerals refer to like parts throughout the several views of the drawings.

#### Detailed Description of the Preferred Embodiments

**[0014]** Referring to FIGS. 1-4, a preferred embodiment of an cycle computer assembly 10 is shown. Computer 10 generally includes casing 12, switch 14, flip 16 and magnet 18.

**[0015]** It will be appreciated that terms such as "front", "back" and "side" used hereinbelow are merely for ease of description and refer to the orientation of the components as shown in the Figures. It should be understood that any orientation of assembly 10 and the components

thereof described herein is within the scope of the present invention.

**[0016]** For exemplary purposes only, described hereinbelow are preferred embodiments wherein assembly 10 is provided for use with a bicycle. As shown in FIG. 1, the assembly 10 is mounted on the handlebars 100 of the bicycle. As discussed above, it will be understood, that the use of the assembly with a bicycle, or any cycle for that matter, is not a limitation on the present invention. For example, assembly 10 can be used with lap top computers, all terrain vehicles, go-karts and the like.

**[0017]** Casing 12 includes a front wall 20, back wall 22 and a plurality of side walls 24 that cooperate to surround a casing interior 26. The casing interior 26 houses the central processing unit (CPU) 28. Preferably, the front wall 20 of the casing 12 includes a screen 20a or the like for displaying information generated by the CPU 28. Casing 12 is preferably comprised of a plastic such as nylon or a phenolic or other synthetic resin. However, casing 14 can be comprised of any material that does not interfere with the magnetic effect exerted by the magnet 18 on the switch 14.

**[0018]** The switch 14 and magnet 18 are mounted in close proximity to each other. Switch 14 is mounted in the casing interior 26 and magnet 18 is attached to the flip 16. Switch 14 is a magnetically actuated switch and is located adjacent one of the side walls 24, and is preferably attached to the side wall 24 by glue or other adhesive.

**[0019]** Switch 14 can be any electro-magnetic switch known in the art, such as a reed-type switch. It will be appreciated by those skilled in the art that the switch elements of a reed switch change state when the reed switch is exposed to a magnetic field, as is necessary for operation of the present invention. Switch 14 can be configured to be normally closed or normally open. Preferably, switch 14 is normally in an open position. Open position is used herein to mean that when the switch is not affected by a magnet the switch is held open, such that the computer is off (i.e., the circuit is open). FIG. 4a illustrates schematically the normally open position. As shown, magnet 18 is far enough from switch 14 so that the magnetic field produced by magnet 18 is not affecting switch 14. Accordingly, switch 14 is held open. In FIG. 4b, the magnet 18 is close enough to switch 14 for the magnetic field produced by the magnet 18 to close the switch 14.

**[0020]** The casing 12 includes opposing members 30 that each have axially aligned openings 32 defined therein for receiving a hinge pin 34. Flip 16 has an opening 16 defined therein for receiving hinge pin 34. In a preferred embodiment, flip 16 has a spring recess 16a therein for receiving a spring 36 that is disposed on the hinge pin 36, as shown in FIG. 2. Spring 36 biases flip 16 in a predetermined position (referred to herein as off position). In off position, a gap 38 is defined between magnet 18 and switch 14. Gap 38 is wide enough so that magnet 18 does not activate or close the switch. It

will be understood that the dimensions of gap 38 are dependent on the sensitivity of switch 14 and the strength of magnet 18. It will be appreciated by those skilled in the art that magnet 18 and switch 14 can be configured for maximum sensitivity as desired.

**[0021]** Because switch 14 is disposed inside the casing 12, practically no moisture can get inside to affect the switch 14, the CPU 28 or the components thereof.

**[0022]** Switch 14 has a pair of lead wires 40 that extend therefrom to the CPU 28. Therefore, when the switch is closed, and the circuit is subsequently closed, the CPU is energized. When the switch is opened, the CPU is shut off.

**[0023]** Referring to FIGS. 3-4b, in operation, as mentioned above, switch 14 is normally open. Flip 16 is normally biased by spring 36 in off position. At this point, the computer is off. When magnet 18 is in this position, the magnetic field produced by magnet 18 is not strong enough to close switch 14 as shown in FIGS. 3 and 4a. To turn the computer on, the flip 16 is pressed inwardly, such that it pivots about hinge pin 34. Flip 16 is then held in the position shown in FIG. 4 (referred to herein as on position). As can be seen in FIGS. 4 and 4b, in the on positions the magnet 18 is in closer proximity to switch 14 and the switch 14 is closed, thereby turning on the computer.

**[0024]** In another embodiment, the position of the flip 16 shown in FIG. 3 may be the on position where the switch is closed and the computer is on. In this embodiment, to place the flip in an off position, the flip 16 is pulled upwardly so that it is substantially parallel to the front wall 20 of the casing. It will be understood that those skilled in the art will be able to make numerous modifications to the orientation of the switch, the magnet and the flip. All such modifications are within the scope of the present invention.

**[0025]** It will be understood that the device is not limited to activation by a magnetic field generating device. Any field, beam or the like that can affect the state of the switch is within the scope of the present invention. For example, a light beam emitting device and appropriate receptor can be used. Sound waves, such as ultrasonic waves produced by a magnetostrictive element can be used.

**[0026]** FIG. 5 shows another embodiment 40 of the present invention. In this embodiment, the casing 12 and the flip 16 are molded out of a resilient material as a single unit. The flip 16 is connected to the casing 12 by a thin strip of resilient hingeable material.

**[0027]** FIG. 6 shows yet another embodiment 60 of the present invention. In this embodiment, the magnet 18 is secured to the backside of a button 62. The casing 12 includes a spring housing 64 extending from a side wall 24 thereof. The spring housing surrounds a spring 66 that biases the button 62 outwardly so that the magnet 18 is held away from switch 14 to allow switch 14 to remain in an open state. To turn the computer on, the button 62 is pressed inwardly so that the magnetic field

produced by the magnet 18 causes the switch to activate the CPU.

**[0028]** The general concept of the invention is a switch disposed inside a casing so that it is weather-proof, wherein the switch is affected by a field, such as a magnetic field, instead of requiring direct manual activation. Preferably, the magnet is movably associated with the outside of the casing so that it can be disposed in at least two positions; one where the magnetic field produced by the magnet affects the switch, and one where it does not. Movably associated with the outside of the casing means that the magnet 18 is outside of the casing 12 and is somehow secured to the casing 12 (whether by flip, button, hinge, etc.) and is capable of moving relative to the casing 12.

**[0029]** The embodiments of the present invention recited herein are intended to be merely exemplary and those skilled in the art will be able to make numerous modifications to them without departing from the spirit of the present invention. All such modifications are intended to be within the scope of the present invention as defined by the claims appended hereto.

## Claims

1. An assembly (10) comprising:

- a) a casing (12),
- b) a magnet sensitive switch (14) disposed inside said casing (12), and
- c) a magnet (18) movably associated with an outside of said casing (12), such that the magnet (18) is capable of movement relative to said casing (12),

wherein said magnet (18) can be disposed in at least two positions, said at least two positions including a first position where the magnetic field generated by the magnet (18) does not affect the switch (14), and a second position where the magnetic field generated by the magnet (18) does affect the switch (14).

2. The assembly (10) of claim 1 further comprising a flip (16) hingedly secured to an outside of said casing, wherein said magnet is secured to said flip (16).

3. The assembly (10) of claim 1 or 2 wherein said casing (12) includes a front wall (20), a back wall (22) and a plurality of side walls (24) that cooperate to surround a casing interior (26), wherein said switch (14) is disposed in said casing interior (26).

4. The assembly (10) of any of the preceding claims wherein said switch (14) is secured to a first side wall of said casing (12) and wherein said flip (16) is hingedly secured to said casing (12) adjacent said

first side wall, such that said flip holds said magnet in said first position.

5. The assembly (10) of any of the preceding claims wherein said flip (16) is hingedly secured to said outside of said casing (12) by a hinge pin (34), and wherein said hinge pin (34) has a spring (36) disposed thereon that biases said flip (16) to hold said magnet (18) in said first position. 5
6. The assembly (10) of claim 5 wherein said hinge pin (34) extends between two opposed members extending from said outside of said casing (12). 10
7. The assembly (10) of any of the preceding claims wherein said casing (12) and said flip (16) are formed as a single unit, and wherein said flip (16) is connected to said casing (12) by a piece of resilient material, such that said flip (16) is normally biased to hold said magnet (18) in said first position. 15 20
8. The assembly (10) of any of the preceding claims wherein said magnet (18) is secured to a button (62) movably coupled to an outside of said casing (12). 25
9. The assembly (10) of claim 8 wherein said button (62) is biased away from said switch (14) by a spring (66), and wherein said spring (66) normally biases said button (62) such that said magnet (18) is held in said first position. 30
10. A cycle computer (10) comprising:
  - a) a casing (12) having a screen (20a),
  - b) an electric circuit disposed inside said casing (12), said circuit including
    - i) a magnet sensitive switch (14) disposed inside said casing (12), and
    - ii) a processor electrically connected to said switch (14) and said screen (20a), 40
  - c) a magnet (18) movably associated with said casing (12), such that the magnet (18) is capable of movement relative to said casing (12), 45

wherein said magnet (18) can be disposed in at least two positions, said at least two positions including a first position where the magnetic field generated by the magnet (18) does not affect the switch (14), and a second position where the magnetic field generated by the magnet (18) does affect the switch (14). 50

and wherein said circuit is open when said magnet (18) is in said first position, and wherein said circuit is closed when said magnet (18) is in said second position. 55

11. The assembly (10) of claim 10 further comprising a flip (16) hingedly secured to an outside of said casing (12), wherein said magnet (18) is secured to said flip (16).

12. The assembly (10) of claim 10 or 11 wherein said switch (14) is secured to a first side wall of said casing (12) and wherein said flip (16) is hingedly secured to said casing (12) adjacent said first side wall, such that said hinge holds said magnet (18) in said first position.

13. A cycle computer (10) comprising:

a) a casing (12) including a front wall (20), a back wall (22) and a plurality of side walls (24) that cooperate to surround a casing interior (26), wherein said front wall (20) includes a screen, said casing (12) further comprising a pair of opposed members extending outwardly from a first side wall thereof,

b) an electric circuit disposed inside said casing (12), said circuit including

- i) a magnet sensitive switch (14) secured to said first side wall of said casing (12), and
- ii) a processor electrically connected to said switch (14) and said screen (20a),

c) a flip (16) hingedly secured to said casing (12) by a hinge pin (34) extending between said opposed members,

d) a spring (36) disposed on said hinge pin (34) and biasing said flip (16) in a predetermined position, and

e) a magnet (18) secured to said flip (16),

wherein said flip (16) positions said magnet (18) in at least two positions, said at least two positions including a first position where the magnetic field generated by the magnet (18) does not affect the switch (14), and a second position where the magnetic field generated by the magnet (18) does affect the switch (14).

14. A cycle computer (10) comprising:

a) a casing (12) including a front wall (20), a back wall (22) and a plurality of side walls (24) that cooperate to surround a casing interior (26), wherein said front wall (20) includes a screen, said casing (12) further comprising a button (62) housing extending outwardly from a first side wall (24) thereof,

b) an electric circuit disposed inside said casing (12), said circuit including

- i) a magnet sensitive switch (14) secured to said first side wall (24) of said casing (12), and
- ii) a processor electrically connected to said switch (14) and said screen,

- c) a button (62) movably coupled to said button housing,
- d) a spring (66) disposed in said button housing and biasing said button (62) outwardly, and
- e) a magnet (18) secured to said button (62),

wherein said button (62) positions said magnet (18) in at least two positions, said at least two positions including a first position where the magnetic field generated by the magnet (18) does not affect the switch (14), and a second position where the magnetic field generated by the magnet (18) does affect the switch (14).

**15. A cycle computer (10) comprising:**

- a) a casing (12) including a front wall (20), a back wall (22) and a plurality of side walls (24) that cooperate to surround a casing interior (26), wherein said front wall (20) includes a screen,
- b) an electric circuit disposed inside said casing (12), said circuit including

- i) a magnet sensitive switch (14) secured to said first side wall (24) of said casing (12), and
- ii) a processor electrically connected to said switch (14) and said screen,

- c) a flip (16) hingedly secured to said casing (12) by a piece of resilient material, wherein said piece of resilient material biases said flip (16) in a predetermined position, and
- d) a magnet (18) secured to said flip (16),

wherein said flip (16) positions said magnet (18) in at least two positions, said at least two positions including a first position where the magnetic field generated by the magnet (18) does not affect the switch (14), and a second position where the magnetic field generated by the magnet (18) does affect the switch (14).

**16. A method of turning on a cycle computer (10), the method comprising the steps of:**

- a) providing a magnet sensitive switch (14),
- b) providing a magnet (18) a predetermined distance from said switch (14),
- c) moving said magnet (18) with respect to said switch (14) to change the state of the switch

- (14), and
- d) energizing said cycle computer (10).

**17. The method of claim 16 further comprising the step of securing said cycle computer (10) to a cycle.**

**18. A switch assembly comprising:**

- a) a source of a magnetic field;
- b) a body associated with the source of the magnetic field; and
- c) a switch (14) displaced from the source of the magnetic field, wherein the source of the magnetic field is biased away from the switch (14).

**19. The switch assembly of claim 18 further including a casing (12) enclosing the switch (14).**

**20. The switch assembly of claim 18 or 19 wherein the casing (12) encloses a device operable by the switch (14).**

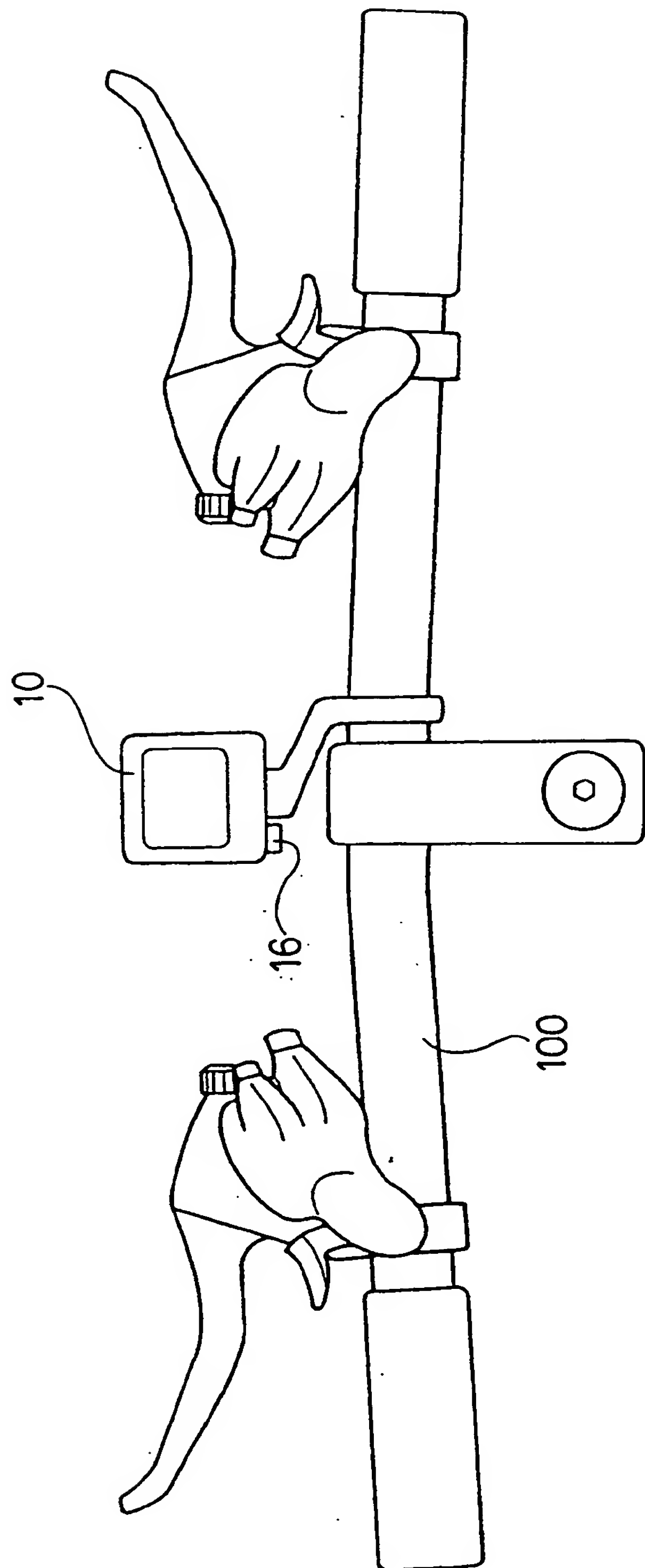


FIG. 1

FIG. 2

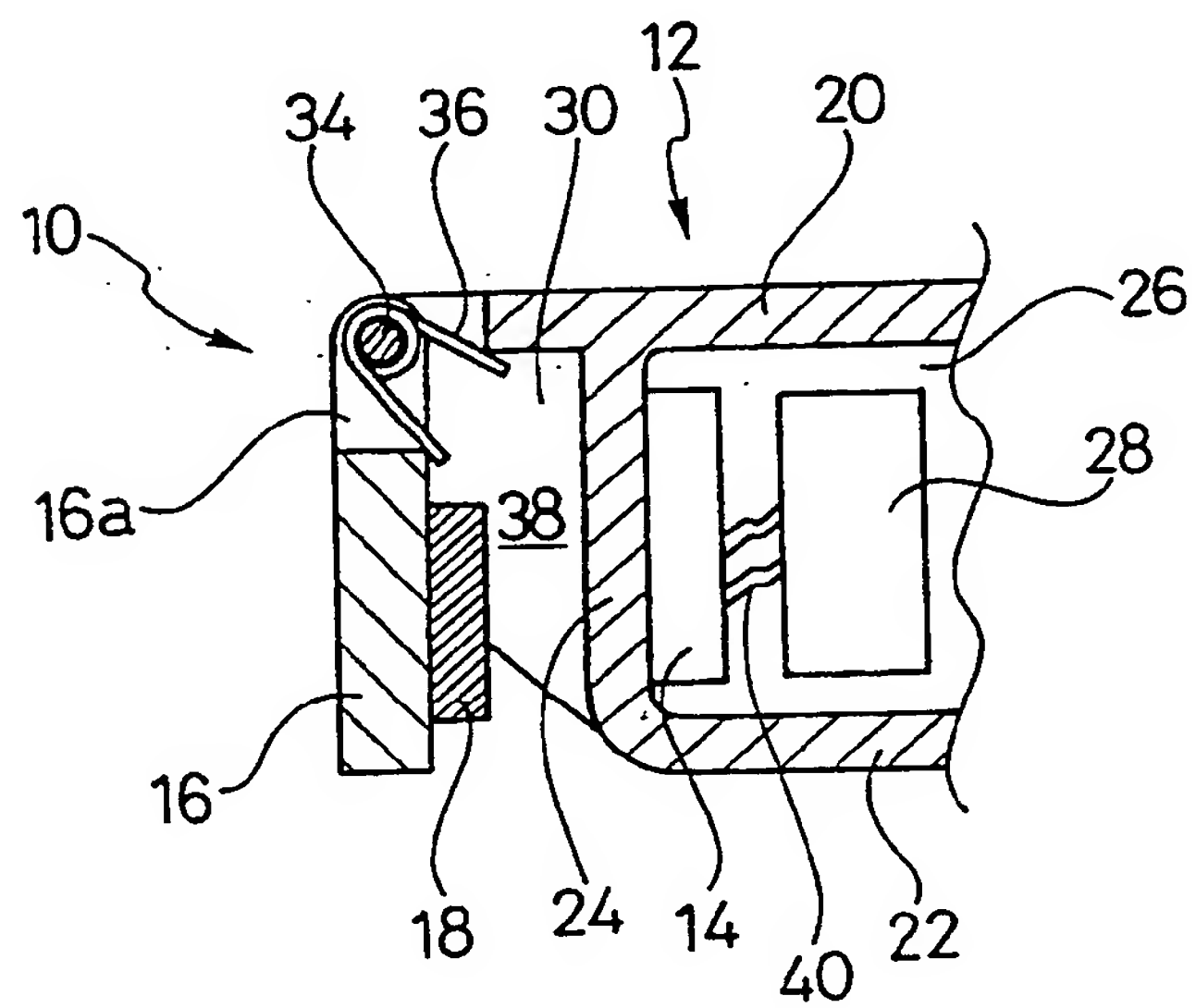
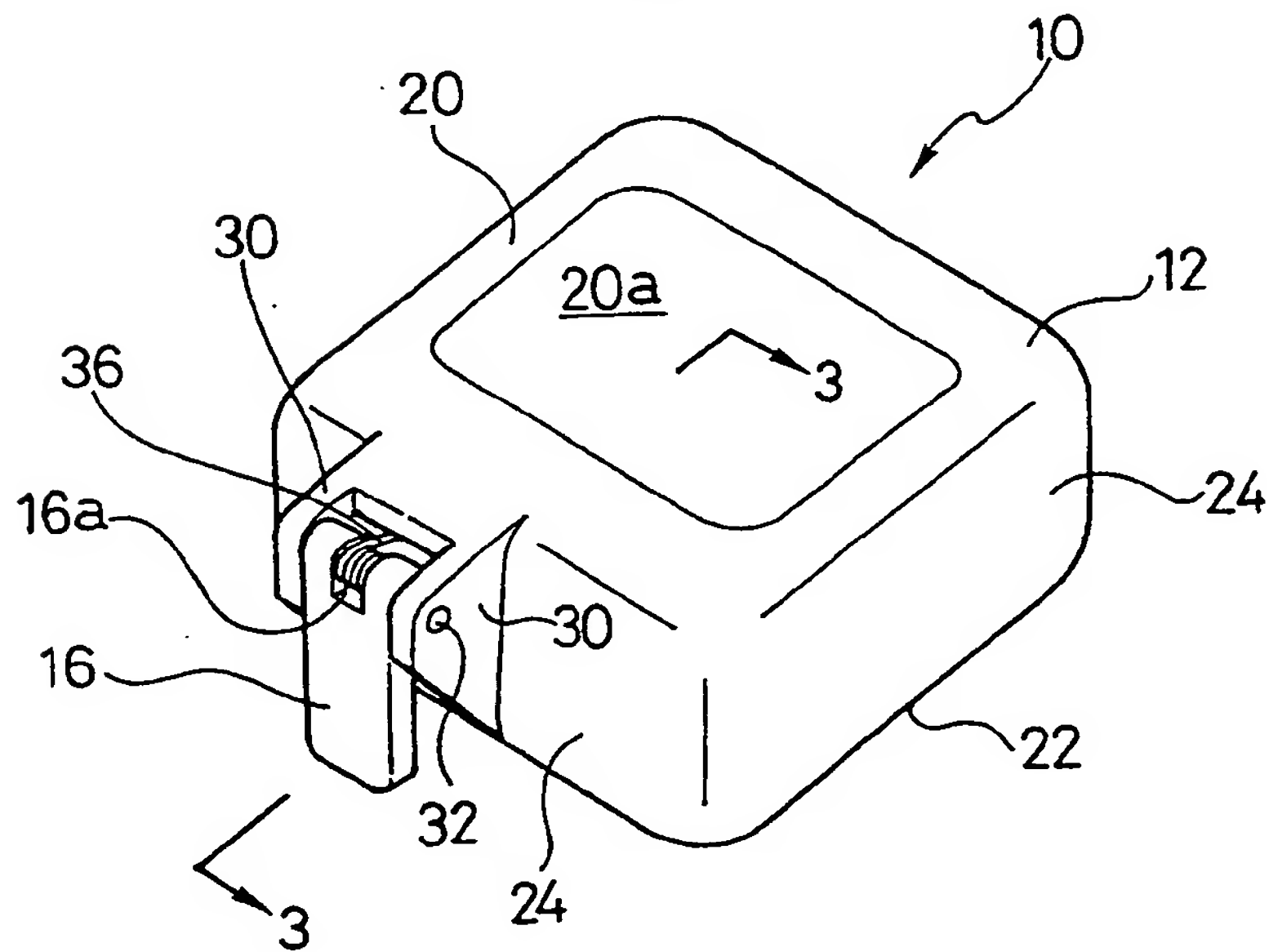


FIG. 3

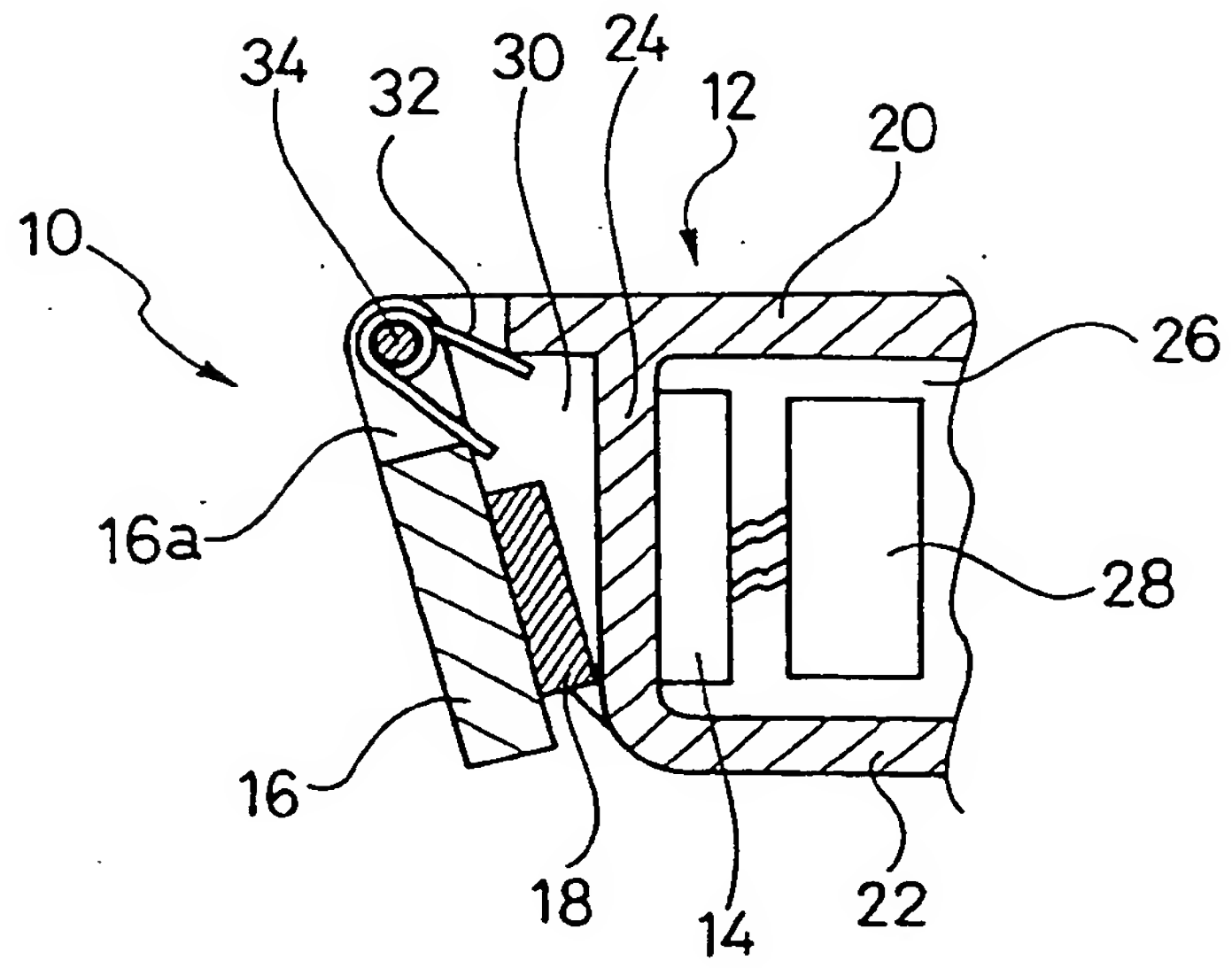


FIG. 4

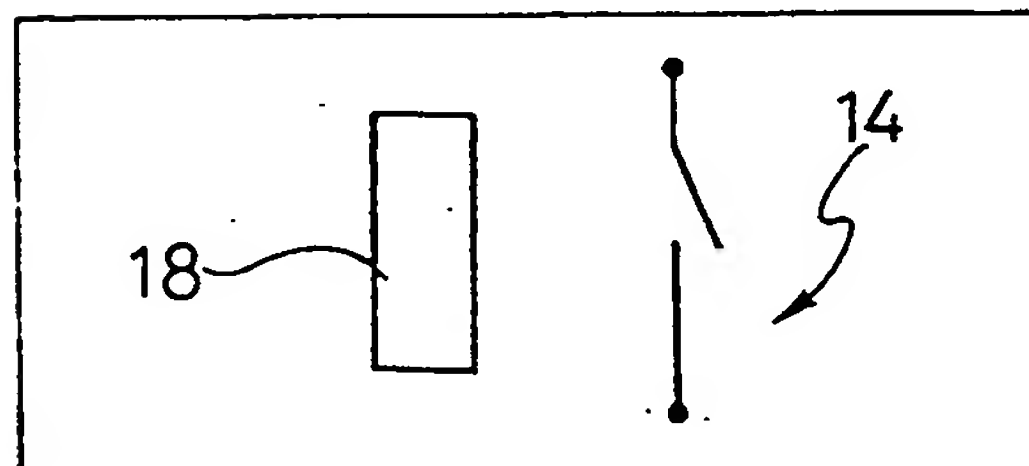


FIG. 4a

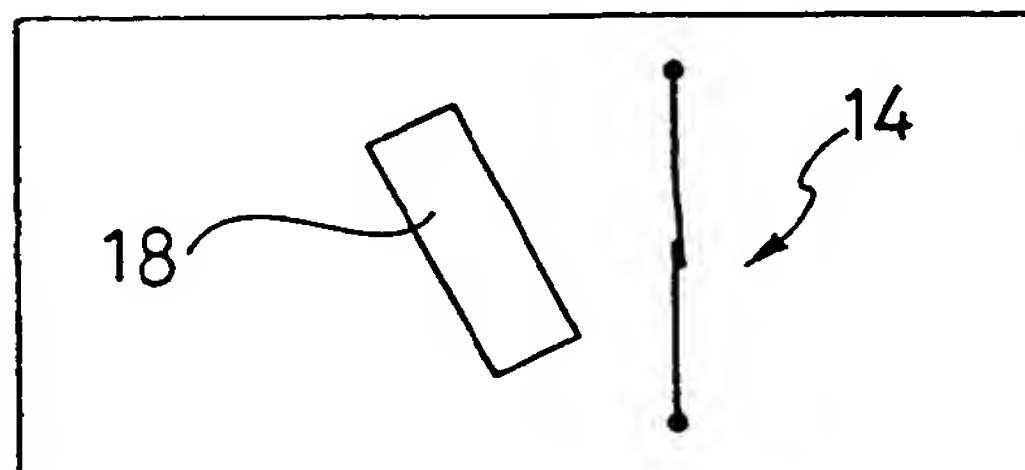


FIG. 4b

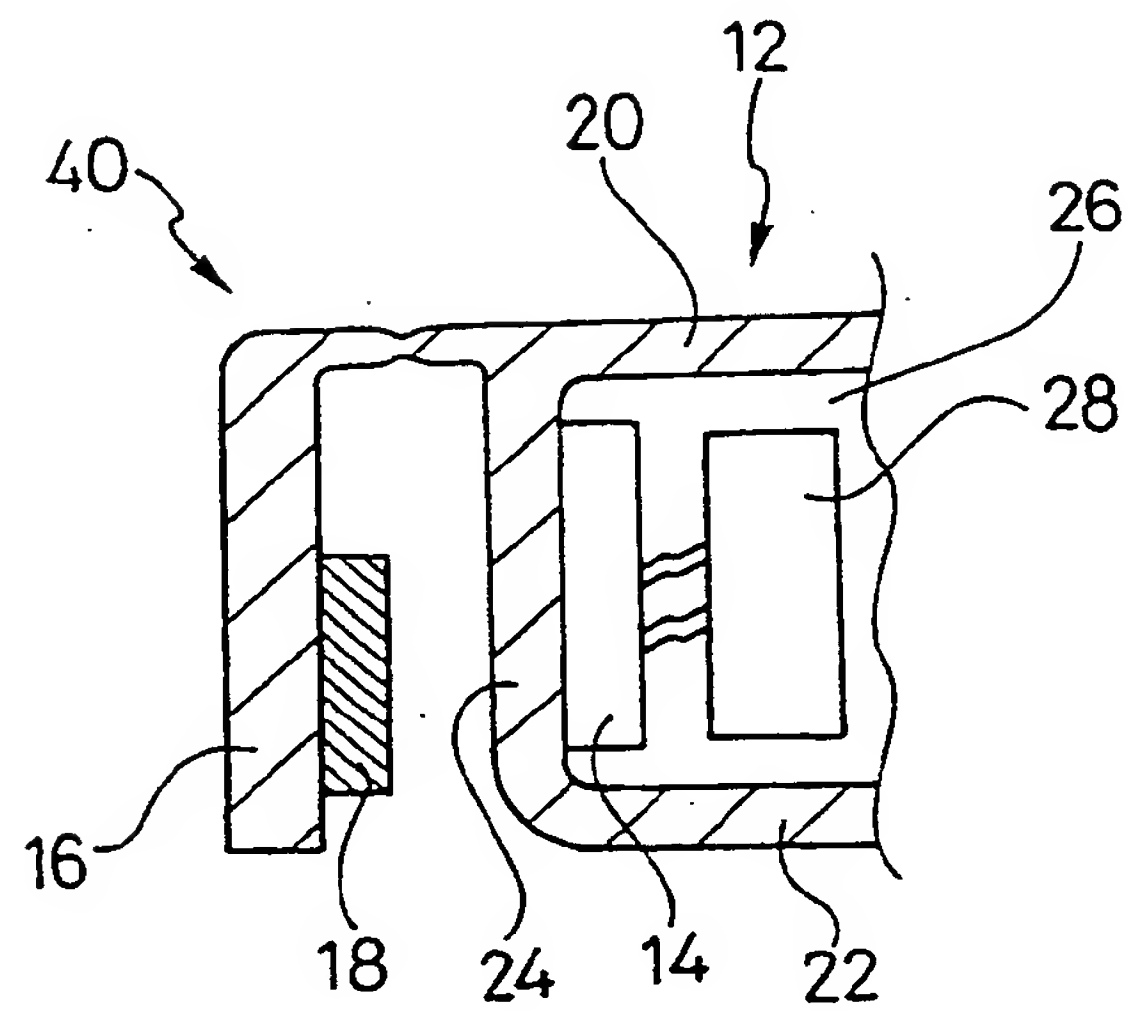


FIG. 5

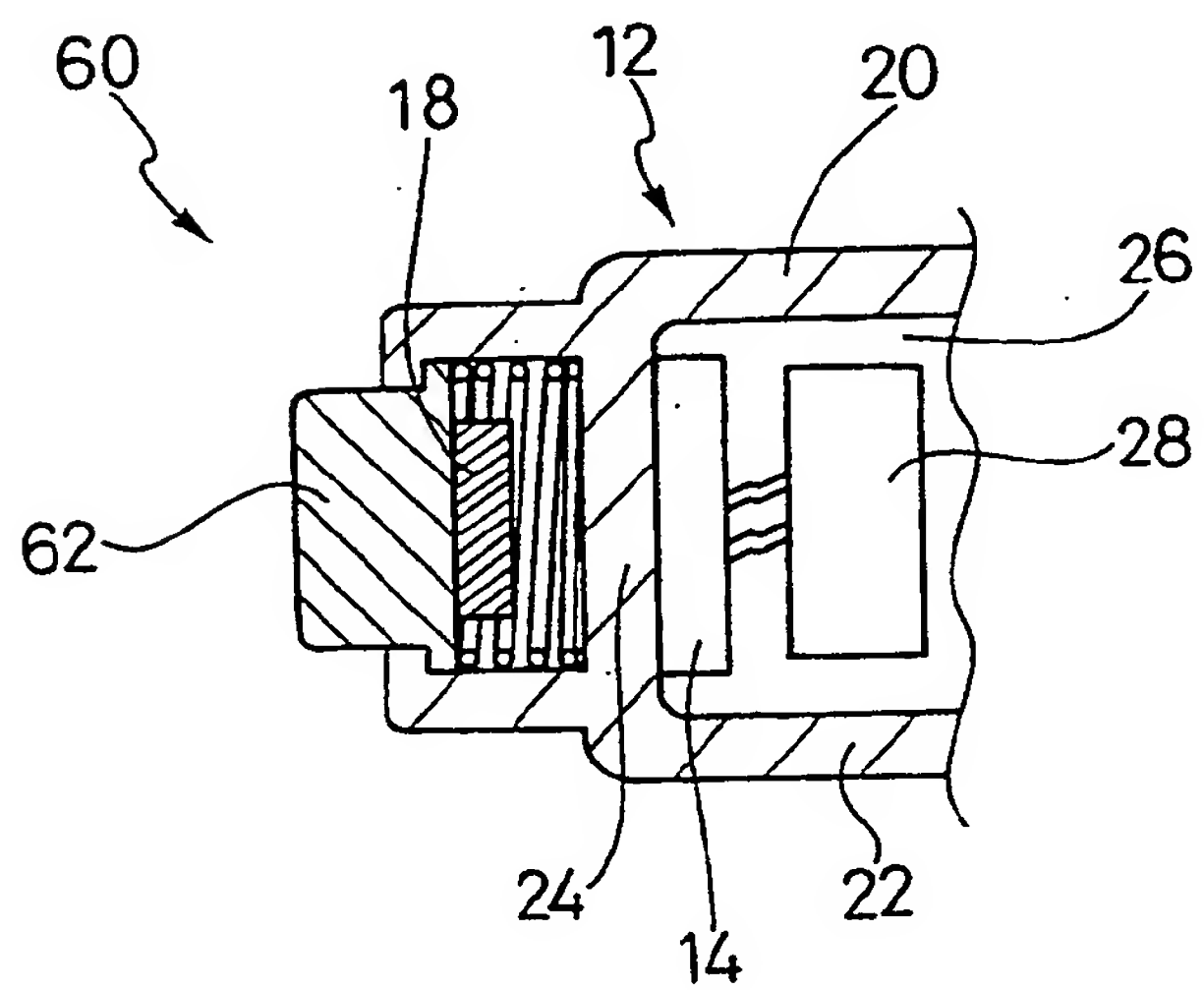


FIG. 6



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 02 00 2976

| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |  |  |
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| The present search report has been drawn up for all claims   |  |  |  |
| Place of search<br><b>THE HAGUE</b>  |  | Date of completion of the search<br><b>27 March 2002</b> | Examiner<br><b>Ruppert, H</b>                |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>L : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>I : document cited for other reasons<br/>* : member of the same patent family, corresponding document</p> |  |  |  |

EPC FORM 1503/03-02-00240-10

# ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 02 00 2976

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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